18 is constructed as abutting layers, second component 22 should be the outermost layer as depicted in FIG. 1.

In development of the present invention, it has been observed that the surface finish and integrity composite of a cementitious 30 board incorporating fabric reinforcement 18 are considerably improved if at least one or, more preferably, both the first component 20 and second component 22 are treated in a manner so as to enhance at least one of the wetting and adhesion characteristics thereof. Such treatment may be performed before or after the first and second components 20, 22 are united. Treatments may include corona or electrical discharge treatments to oxidize the surfaces of the first and/or second components. Alternatively, first and/or second components may be coated with one or more surfactants, hydrophilic compounds, foam boosters/stabilizers and polar polymer topical solutions, such as polyvinyl alcohol, to enhance adhesion and promote continuity of cement slurry about the reinforcement when the reinforcement is later embedded in cementitious matrix material.

In addition, cement powder may be slurried with one or more hydrophilic additives, wetting agents, foaming agents and foam boosters and applied to either or both of the first and second components 20, 22. Following application, the coated reinforcement is immediately dried to prevent significant reaction of the cement with water (i.e., hydrating) that might otherwise cause the reinforcement to stiffen and resist rolling. A polymer may also be included in the slurry to assure that the cement powder remains bound to the reinforcement fibers and does not flake off after drying. An advantage to this type of pretreatment is that it imbues the reinforcement with cementing properties and avoids the need to pretreatment of the reinforcement with cement slurry on the cement board assembly line.

If desired, the nonwoven web second component 22 may be fabricated from loose fibers that are joined by a chemical binder. Depending on the composition or nature of the fibers, e.g., carded webs, the fibers and the binder chosen to join the fibers may have varying degrees of hydrophilicity. Thus, selection of appropriate fibers and/or hydrophilic binder may reduce or even eliminate the need for subsequent wetting and adhesion enhancing treatments on the second component 22.

The comparatively open mesh first component 20 and nonwoven web second component 22, when united and embedded in a cementitious board promote penetration of cement slurry yet resist pin-holes or roughness which would mar the board faces 12, 14. Additionally, while employing two distinct fabrics, composite fabric reinforcement 18 is less expensive to manufacture than a single denser mesh of lighter weight glass yarns, e.g., about 20×20 ends per inch, that would be needed to produce comparable slurry penetration and board surface smoothness.

Referring to FIG. 2, there is shown an apparatus 24 suitable for manufacturing a reinforced cementitious board having the general construction of board 10 shown in FIG. 1. Apparatus 10 is operable for continuous production of a cementitious ribbon or strip suitable for cutting into individual panels or boards of desired length. Apparatus 24 dispenses a continuous length of carrier or release paper 26 from a spool, roll or similar supply 28 onto a moving endless conveyor belt 30 entrained about a roller 32 and second unillustrated roller at least one of which is rotatably driven. A first continuous length composite fabric reinforcement 18, according to the present invention, is simultaneously dispensed from a spool, roll or similar supply 34 and delivered to conveyor belt 30. The carrier paper 26 supports the first length of reinforcement 18 as it is drawn through apparatus 24 by conveyor belt 30.

As an alternative to treating one or both of the first and second components 20, 22 of reinforcement substantially at their time of manufacture, such components may be treated to enhance their wetting and adhesion characteristics as an in-line step of the reinforced board manufacturing process. That is, as indicated in FIG. 2, reinforcement 18 may first be sprayed or treated at a suitable pretreatment station 36 at which preferably both sides of the reinforcement are treated to enhance the wetting and/or adhesion characteristics thereof. Treatment at station 36 may include any of the corona or electrical discharge treatments or surfactant, hydrophilic compound, foam booster/stabilizer or polar polymer topical coating processes enumerated above.

Upon reaching the conveyor belt 30, reinforcement 18 is moved by the belt under a hopper 38, where cementitious matrix material 16 is discharged onto the reinforcement by known means, such as a rotating dispensing device 40. The matrix material is then spread into a uniform layer as it passes under screed means 42 and, preferably vibrating, compaction roller 44 and between unillustrated side rails. Although not illustrated, it will be understood that, if necessary, reinforcement 18 may first be passed through hydraulic cement slurry to assure good penetration of the reinforcement 18 with the slurry prior to receipt of the cementitious matrix material.

The process thus far described would be sufficient for embedding reinforcement 18 adjacent one of the faces 12, 14 of board 10 (FIG. 1). However, it is normally desirable to reinforce a cementitious board adjacent both its faces. Accordingly, a second continuous length of composite fabric 18 may be deposited on the mass of cementitious matrix material 16 following compaction by roller 44. The second length of fabric 18 may be dispensed from a second spool, roll or similar supply 46. If desired, the fabric dispensed from supply 46 may be treated at a treatment station 48 preferably identical or substantially similar to station 36 to enhance the wetting and adhesion characteristics thereof. Additionally, the second length of composite reinforcement 18 may also be passed through hydraulic cement slurry to assure good penetration of the reinforcement with the slurry 16 prior to placement of the reinforcement onto the uncured matrix material 16. Following placement of the second length of reinforcement 18, the moving strip 50 is desirably compacting compacted by a second, preferably vibrating, roller 52. The uncured, reinforced cementitious strip can then be cut by unillustrated means into individual boards or panels and stacked for curing. In the alternative, apparatus 24 may include an in-line curing station for hardening the strip 50 after which the cured strip may be cut into boards 10 (FIG. 1).

Although the invention has been described in detail for the purpose of illustration, it is to be understood that such detail is solely for that purpose and that variations can be made therein by those skilled in the art without departing from the spirit and scope of the invention except as it may be limited by the claims.

What is claimed is:

1. A method of making a reinforced smooth cementitious board having a cement skin adjacent to an outer face, comprising:

(a) depositing a reinforcement fabric and a layer of hydraulic cementitious material, one on the other, wherein the reinforcement fabric comprises an open mesh united with a thin, porous nonwoven web, wherein the open mesh has glass fibers encapsulated with an alkali resistant material, and joined with a binder at intersection areas thereof within the open mesh;

(b) prior to depositing the reinforcement fabric and the layer of hydraulic cementitious material one on the